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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,771	09/08/2003	Raymond Bernard Edelman	7784-000312DVA	3954

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EXAMINER
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MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/657,771

Applicant(s)

EDELMAN ET AL.

Examiner

Rodney G. McDonald

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,6-15,21-26 and 31-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,6-15,21-26 and 31-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 6, 9, 10, 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Early (U.S. Pat. 5,756,924) in view of Few et al. (U.S. Pat. 5,404,712) and Bussing (U.S. Pat. 6,062,018).

Regarding claim 1, Early teach a device for optically establishing a combustive reaction with a fuel and air mixture. (See Abstract; Column 4 lines 50-56) The device is shown in Fig. 3. (See Fig. 3) The device has an optical energy source 20 in the form of a laser for generating an optical signal for combustion. (Column 7 lines 25-28) The chamber where combustion takes place can be in engines such as jet engines containing a fuel air mix for example. (Column 14 lines 44-48; Column 10 lines 54-56) A transfer device in the form of a beam splitter optic can interconnect the optical energy source 20 with the combustion chamber. (Column 7 lines 43-46) An intensity profiler in the form of a focusing lens 26 can be used to adjust the power and the density of the laser light within the fuel medium. (Column 7 lines 46-48) The device is operated such that the fuel is contacted with a short duration laser pulse to form a plasma and to initiate fuel combustion; and contacting the plasma with a long duration laser pulse, thereby stabilizing and sustaining the fuel combustion. (Column 2 lines 66-68; Column

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3 lines 1-3) Fig. 2b shows the subsequent laser pulse 2 following the initial short duration high peak power pulse 1 with virtually no temporal delay. (Column 5 lines 55-57) The laser system must provide a highly specialized output pulse format consisting of at least two sequential pulses or a single pulse, which can approximate the characteristics of the two sequential pulse widths. (Column 6 lines 55-60)

Regarding claims 6, the optical energy source includes a laser. (Column 7 line 25)

Regarding claim 9, the output signal includes laser light. (Column 7 lines 48)

Regarding claim 10, the light includes a laser beam. (Column 7 line 48)

Regarding claim 12, the power can be up to 20 MW. (Column 8 line 19)

Regarding claim 13, the combustion reaction yields a dissociated mixture of ionized species. (Column 4 lines 51)

Regarding claim 14, the combustion reaction would inherently yield molecular and atomic oxygen as well as cracked fuel. (Column 4 line 51)

The difference between Early and the present claims is that the use of a slurry is not discussed.

Regarding the use of a slurry as the fuel, Bussing teach that pulse detonation combustion system can combust fuels such as coal, coal slurry, natural gas and other liquid hydrocarbons. (Column 2 lines 30-35)

The motivation for utilizing a coal slurry is that it allows for combustion of such a fuel. (Column 2 lines 30-37)

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Early by utilizing a coal slurry as taught by Bussing because it allows for combustion of such a fuel.

Claims 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Early in view of Bussing as applied to claims 1, 6, 9, 10, 12-14 above, and further in view of Few (U.S. Pat. 5,404,712).

The differences not yet discussed is where the transfer device is an optical fiber (Claim 7) and where the laser light includes wavelengths of light of less than 300 nm (Claim 11).

Few et al. teach a device for optically initiating a combustion reaction from an air/fuel supply. (See Abstract) Fig. 1 shows the device having an optical energy source in the form of a laser 12. A combustion chamber 22 is present having a fuel injector 24 for providing the fuel/air mixture 26 to the combustion chamber. A device in the form of an optical fiber 16 provided the optical energy to the combustion chamber. (Column 3 lines 60-68; Column 4 lines 1-21) The optical energy includes a laser. (Column 3 lines 60-68; Column 4 lines 1-21) The transfer device includes a fiber optic. (Column 4 line 2) The output includes light. (Column 7 lines 64-68) The light includes a laser beam. (Column 7 lines 64-68) The light is **approximately** 0.3 micrometers. (Column 7 line 68) Here approximately is to interpreted to be around 0.3 micrometers which would indicate some values less than 0.3 micrometers as required by Applicant's claim 11. The combustion yields a dissociated mixture. (Column 4 lines 61-68; Column 5 lines 1-14)

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The motivation for utilizing an optical fiber and wavelength of less than 300 nm is that it allows for introducing a coherent pulse of laser into a fuel mixture. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a fiber optic and a wavelength of less than 300 nm as taught by Few et al. because it allows for introducing a coherent pulse of laser into a fuel mixture.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Early in view of Bussing and further in view of Few as applied to claims 1, 6, 7, 9-14 above, and further in view of Firnberg et al. (U.S. Pat. 5,374,405).

The difference not yet discussed is where the fiber optic includes a fiber optic bundle (Claim 8).

Firnberg et al. teach the use of a fiber optic bundle for a combustion bed. The energy source for the radiation can be located outside of the bed and directed into the bed with an appropriate optical arrangement. For example, solar flux can be concentrated and directed into the bed with a series of mirrors and/or through the use of a fiber optic bundle. (Column 6 lines 22-27)

The motivation for utilizing a fiber optic bundle is that it allows directing of radiation into a combustion reactor. (Column 6 lines 22-27)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a fiber optic bundle as taught by Firnberg et al. because it allows for directing radiation into a combustion reactor.

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Claims 15, 21, 23-26, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Early in view of Bussing and further in view of Few as applied to claims 1, 6, 7, 9-14 above, and further in view of Hunt et al. (U.S. Pat. 6,385,963).

The difference not yet discussed is where an optical wavelength filter is utilized (Claim 15).

Hunt et al. teach providing optical energy to a combustion chamber that utilizes a wavelength filter for selecting the wavelength to be conveyed to the chamber. (Column 4 lines 7-12)

The motivation for utilizing an optical filter is that it allows for selecting the wavelength to be conveyed to the chamber. (Column 4 lines 7-12)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized an optical filter as taught by Hunt et al. because it allows for selecting the wavelength to be conveyed to the chamber.

Claims 22 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Early in view of Bussing and further in view of Few and Hunt et al. and as applied to claims 1, 6, 7, 9-14, 15, 21, 23-26, 32 and 33 above, and further in view of Firnberg et al. (U.S. Pat. 5,374,405).

The difference not yet discussed is where the optical fiber is a solarizing optical fiber. (Claim 22)

Firnberg et al. teach the use of a fiber optic bundle for a combustion bed. The energy source for the radiation can be located outside of the bed and directed into the bed with an appropriate optical arrangement. For example, solar flux can be

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concentrated and directed into the bed with a series of mirrors and/or through the use of a fiber optic bundle. (Column 6 lines 22-27)

The motivation for utilizing a fiber optic bundle is that it allows directing of radiation into a combustion reactor. (Column 6 lines 22-27)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a solar fiber optic bundle as taught by Firnberg et al. because it allows for directing radiation into a combustion reactor.

### ***Response to Arguments***

Applicant's arguments filed 9-7-05 have been fully considered.

In response to the argument that the prior art of record does not teach an intensity profiler for modifying an optical signal to have a high peak power at a leading edge for igniting a slurry fuel and air mixture, thereby initiating the combustive reaction, and a lower peak power during a remainder of the optical signal to maintain the combustive reaction, it is argued that newly applied reference to Early suggest contacting a fuel with a short duration laser pulse to form a plasma and to initiate fuel combustion and contacting the plasma with a long duration laser pulse thereby stabilizing and sustaining the fuel combustion. The pulses can be continuous with a short duration high peak power and longer duration low peak power pulse. A single pulse can be utilized which can approximate the characteristics of two sequential pulses. An intensity profiler in the form of a focusing lens can control the power density and focal volume of the laser beam. (See Early discussed above)

This action will be made NON-FINAL based on the citation of the Early reference.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald  
Primary Examiner  
Art Unit 1753

RM  
September 8, 2005